CLAIMS

What is Claimed:

1. A method for inducing an immune response in an animal, comprising:

(a) providing a composition comprising a polynucleotide encoding at least an immunogenic portion of a WT1 polypeptide, wherein the polynucleotide has at least 90% identity to SEQ ID NO:452, 389, 453, and 381, and

(b) administering said composition to the animal;

thereby inducing an immune response in the animal.

2. The method of claim 1, wherein said composition further comprises a component selected from the group consisting of a physiologically acceptable carrier and an adjuvant.

3. The method according to claim 1, wherein the WT1 polynucleotide is delivered by a viral based delivery system.

4. The method according to claim 3, wherein the viral based delivery system is an adenovirus.

5. The method according to claim 3, wherein the viral based delivery system is an alphavirus.

6. The method according to claim 1, wherein the WT1 polynucleotide is delivered as a naked DNA.

7. The method of claim 1, wherein the immune response induced is a CD8+ cytotoxic T lymphocyte response.

8. The method of claim 1, wherein the immune response induced is both a CD4+ T helper and CD8+ cytotoxic T cell immune response.

9. A method for treating a malignancy associated with WT1 expression in a patient, comprising administering to the patient a composition comprising a first component selected from the group consisting of physiologically acceptable carriers and immunostimulants, and a second component comprising at least an immungenic portion of a WT1 polypeptide.

10. An isolated polypeptide comprising at least an immunogenic portion of the WT1 protein, wherein said polypeptide comprises the amino acid sequence set forth in SEQ ID NO:241.

11. The isolated polypeptide according to claim 10 wherein the polypeptide has been modified such that the ability of the polypeptide to bind to HLA-A2 is increased relative to that of the polypeptide set forth in SEQ ID NO:241.

12. The isolated polypeptide according to claim 11 wherein said polypeptide has increased immunogenicity relative to the polypeptide set forth in SEQ ID NO:241.

13. The isolated polypeptide according to claim 11 wherein said polypeptide comprises an amino acid sequence selected from the group consisting of any one of SEQ ID NOs:414-450.

14. The isolated polypeptide according to claim 10 wherein the polypeptide has been modified such that the ability of the polypeptide to bind to HLA-A2 is increased relative to that of the polypeptide set forth in SEQ ID NO:241.

15. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 1 (P1) of SEQ ID NO:241

16. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 2 (P2) of SEQ ID NO:241.

17. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 4 (P4) of SEQ ID NO:241.

18. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 6 (P6) of SEQ ID NO:241.

19. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 8 (P8) of SEQ ID NO:241.

20. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 9 (P9) of SEQ ID NO:241.

21. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 1 (P1) and position 4 (P4) of SEQ ID NO:241.

22. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 1 (P1) and position 9 (P9) of SEQ ID NO:241.

23. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 1 (P1), position 4 (P4), and position 9 (P9) of SEQ ID NO:241.

24. The isolated polypeptide according to claim 14 wherein said modification comprises a substitution at position 6 (P6) and position 9 (P9) of SEQ ID NO:241.

25. An isolated polypeptide comprising at least an immunogenic portion of a WT1 polypeptide, wherein said immunogenic portion comprises an amino acid sequence selected from the group consisting of:

(i) a sequence set forth in SEQ ID NO:451; and

(ii) a polypeptide selected from the group consisting of:

(a) a sequence set forth in any one of SEQ ID NOs:414-450;

(b) a sequence having at least 70% identity to a sequence set forth in any one of SEQ ID NOs:414-450; and

(c) a sequence having at least 90% identity to a sequence set forth in any one of SEQ ID NOs:414-450;

wherein the ability of the polypeptide to bind to HLA-A2 is increased relative to that of the polypeptide set forth in SEQ ID NO:241.

26. A method for inducing an immune response in a mammal, comprising:

(a) providing a composition comprising a polynucleotide encoding the isolated polypeptide of claim 25; and

(b) administering said polynucleotide to the mammal;

thereby inducing an immune response in the mammal.

27. An expression vector comprising a polynucleotide of any one of the sequences set forth in SEQ ID NOs:452 and 453 or a polynucleotide encoding the isolated polypeptide of claim 25 operably linked to an expression control sequence.

28. A host cell transformed or transfected with an expression vector according to claim 27.

29. A method for stimulating and/or expanding T cells specific for a tumor protein, comprising contacting T cells with at least one component selected from the group consisting of:

(a) a polypeptide according to claim 25;

(b) antigen-presenting cells pulsed with or that express a polypeptide according to claim 26,

under conditions and for a time sufficient to permit the stimulation and/or expansion of T cells.

30. An isolated T cell population, comprising T cells prepared according to the method of claim 29.

31. A composition comprising a first component selected from the group consisting of physiologically acceptable carriers and immunostimulants, and a second component selected from the group consisting of:

(a) polypeptides according to claim 25; and

(b) T cells according to claim 31.

32. A method for stimulating an immune response in a patient, comprising administering to the patient a composition of claim 31.

33. A method for the treatment of a cancer in a patient, comprising administering to the patient a composition of claim 32.

34. An isolated polypeptide comprising an amino acid sequence of any one of SEQ ID NOs:454-455.